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# Ion migration in flow batteries

What are examples of ionic migration?

Many energy-related materials rely on ionic migration for their function. Examples include the flow of ions in battery or fuel cell electrolytes or the coupled flow of ions and electrons in electrodes and membrane materials. As such, understanding, controlling, and improving ionic migration is a major focus of modern materials science.

Can redox flow battery separators improve ion transport?

Selectively tuning ion transport through redox flow battery separators is a promising approach toward increasing cell capacity, power density, and, ultimately, economic feasibility. However, this process is complex with numerous forces and coupled molecular interactions driving and impacting transport under different operating regimes.

What is ion transport in flow-battery separators?

A fundamental description of ion transport in flow-battery separators can guide the development of new separators by identifying the nature of ion selectivity under given conditions.

What drives ion transport through RFB membranes?

Ion transport through RFB membranes is driven by diffusion, convection, and migration. The diffusive flux is characterized by membrane permeability at zero current. Migration occurs under an applied current that drives active ions in a particular direction, which flow in opposing or allied directions of diffusive flux.

These frameworks are meticulously engineered to optimize ion migration pathways within zinc batteries, promoting rapid ion transport and consistent zinc deposition. This approach ...

As demand for high-performance energy storage grows across grid and mobility sectors, multivalent ion batteries (MVIbBs) have emerged as promising alternatives to lithium ...

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This phenomenon, known as concerted ion migration, allows many ions to participate efficiently in conduction and simultaneously lowers the energy barrier for ion ...

Ion mobility in electrolytes and electrodes is an important performance parameter in electrochemical devices, particularly in batteries. In this review, the authors concentrate on the ...

Ionic liquids (ILs) have been widely studied and used in energy storage devices, such as lithium ion battery, for their unique prospective properties. Herein, the key role of ILs ...

This study on iron-chromium redox flow batteries reveals that ion migration, propelled by

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potential differences, concentration gradients, and osmotic pressure, enriches ...

Aqueous zinc-iodine flow batteries show potential in large-scale storage but face water imbalance-induced instability. Here, authors develop a tailored ionic-molecular sieve ...

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Solid polymer electrolytes (SPEs) emerge as prime candidates for next-generation solid-state lithium metal batteries, capitalizing on their intrinsic electrochemical robustness and enhanced ...

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